

**What is claimed is:**

1. A process for preparing trivalent organophosphorus compounds by condensing phosphorus compounds of the formula i



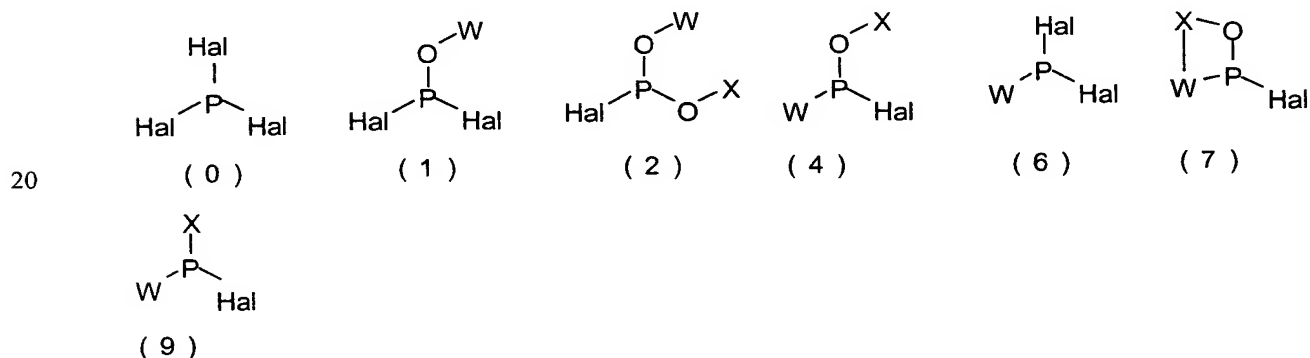
where Hal = halide selected from chlorine, bromine and iodine and may be the same or different when a plurality of halides are present ( $a > 1$ ), R is an organic radical bonded to the phosphorus via a carbon or oxygen atom, and, when  $a < 2$ , the R radicals present may be the same or different, and  $a =$  from 1 to 3,

- 10 with organic compounds which have at least one OH group,  
which comprises

carrying out the condensation reaction in the presence of at least one basic ion exchange resin.

- 15 2. The process of claim 1,  
wherein

the phosphorus compound of the formula i used is at least one compound selected from the compounds of the following formulae



- 25 where W and X are substituted or unsubstituted, aliphatic, alicyclic, aliphatic-alicyclic, heterocyclic, aliphatic-heterocyclic, aromatic-aromatic or aliphatic-aromatic hydrocarbons having from 1 to 50 carbon atoms, and W or X are the same or different or covalently joined together.

## 3. The process of claim 1 or 2,

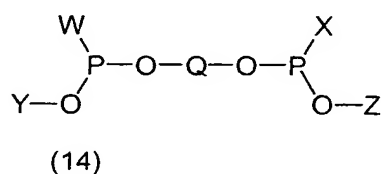
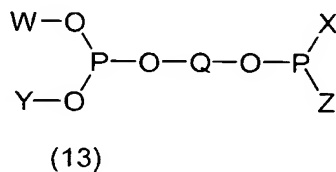
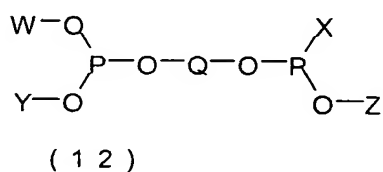
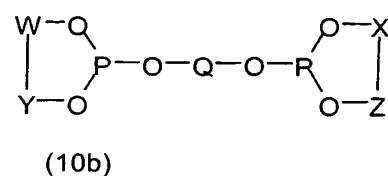
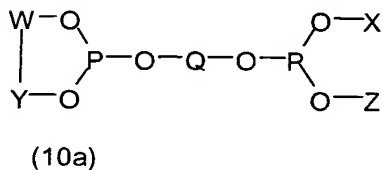
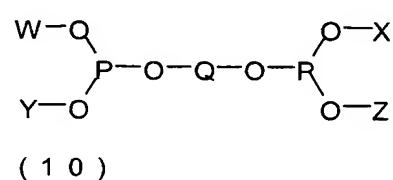
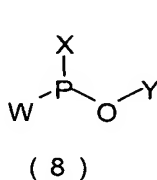
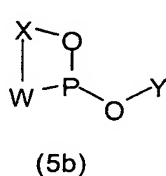
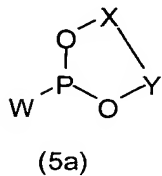
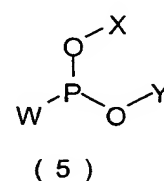
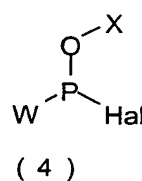
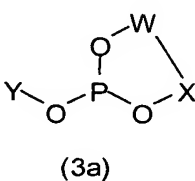
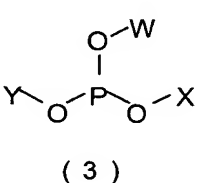
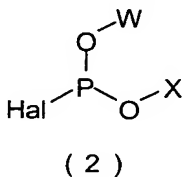
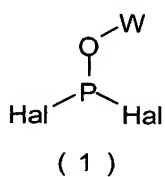
wherein

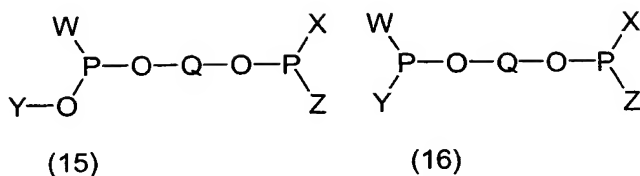
the compound used which has at least one hydroxyl group is at least one substituted or unsubstituted compound selected from methanol, ethanol, n-propanol, isopropanol, 1-butanol, 2-butanol, t-butanol, 2-ethylhexanol, isononanol, isodecanol, isotridecanol, phenol, phenol derivatives, 1,4-dihydroxybenzene, 1,2-dihydroxybenzene, 1,8-dihydroxynaphthalene, 1,1'-binaphthyl-2,2'-diol or 2,2'-binaphthyl-1,1'-diol, and the substituted compounds may have substituents selected from primary, secondary and tertiary alkyl groups, alicyclic groups, aromatic groups,  $-N(R^5)_2$ ,  $-NHR^5$ ,  $-NH_2$ , fluorine, chlorine, bromine, iodine,  $-CN$ ,  $-C(O)-R^5$ ,  $-C(O)H$  or  $-C(O)O-R^5$ ,  $-CF_3$ ,  $-O-R^5$ ,  $-C(O)N-R^5$ ,  $-OC(O)-R^5$  and/or  $-Si(R^5)_3$ , where  $R^5$  is a monovalent hydrocarbon radical, and, when a plurality of hydrocarbon radicals  $R^5$  is present, they are the same or different.

## 4. The process of one of claims 1 to 3,

wherein

the trivalent organophosphorus compound prepared is at least one compound selected from the compounds of the following formulae





where W, X, Y and Z are each substituted or unsubstituted, aliphatic, alicyclic, aliphatic-alicyclic, heterocyclic, aliphatic-heterocyclic, aromatic-aromatic or aliphatic-aromatic hydrocarbon radicals having from 1 to 50 carbon atoms, and W, X, Y and Z are the same or different or covalently joined together, and where Q is an at least bivalent, substituted or unsubstituted, aliphatic, alicyclic, aliphatic-alicyclic, heterocyclic, aliphatic-heterocyclic, aromatic, aromatic-aromatic or aliphatic-aromatic hydrocarbon radical.

5. The process of claim 4,

wherein

the compounds of the formulae (1), (2), (3), (3a), (4), (5), (5a), (5b) or (8) are each prepared by initially charging the phosphorus compound together with one or more basic ion exchange resins and subsequently metering in the compound having an OH group.

6. The process of claim 4,

wherein

asymmetric diphosphorus compounds are prepared by initially charging the compound having OH groups together with one or more basic ion exchange resins and subsequently metering in the phosphorus compound.

7. The process of one of claims 1 to 6,

wherein

the reaction of in each case a compound which has at least one phosphorus-halogen bond with a compound having at least one hydroxyl group is one reaction step.

8. The process of claim 7,

wherein,

when a plurality of reaction steps is carried out, they may be carried out continuously or batchwise.

9. The process of claim 7 or 8,  
wherein,  
when a plurality of reaction steps is carried out, the same or different ion exchangers are  
5 used in the reaction steps.
10. The process of one of claims 7 to 9,  
wherein,  
when a plurality of reaction steps is carried out, the same or different temperatures are set  
10 in the reaction steps.
11. The process of at least one of claims 1 to 10,  
which  
is carried out in the presence of one or more solvents which are selected from the group of  
15 benzene, chlorobenzene, toluene, xylenes, pentane, n-hexane, n-heptane, cyclohexane,  
methylcyclohexane, diethyl ether, diisopropyl ether, methyl tert-butyl ether, anisole,  
tetrahydrofuran, 1,4-dioxane, 1,3-dioxolane, ethyl acetate, isobutyl acetate, tert-butyl  
acetate, ethylene carbonate, propylene carbonate, 1,2-butylene carbonate, acetone, 2-  
butanone, 3,3-dimethyl-2-butanone, benzonitrile, propionitrile, acetonitrile, lactones, N-  
20 methylpyrrolidone, dimethylformamide, dimethyl sulfoxide, N-alkylmorpholines and  
sulfolane.
12. The process of at least one of claims 1 to 11,  
which  
25 is carried out in the presence of polymeric, weakly basic ion exchange resins based on  
styrene-divinylbenzene copolymers which bear N,N-dialkylamine groups.
13. The process of one of claims 1 to 12,  
wherein  
30 the ion exchanger is used in the form of particles having an average particle size of from  
10  $\mu\text{m}$  to 2 mm or in the form of a fixed package.

14. The process of one of claims 1 to 13,  
wherein  
the ion exchanger is dried before use in the process according to the invention.
- 5 15. The process of one of claims 1 to 14,  
which  
is carried out in the presence of a proton transferrer.